

In the claims:

1. **(Currently Amended)** An ionic liquid composition comprising greater than 70 weight percent of an ionic liquid comprising:

(a) ~~a quaternary ammonium, phosphonium or sulfonium cation having from about 4 to about 16 carbon~~ independently selected from the group consisting of:

substituted or unsubstituted pyridinium, pyridazinium, pyrimidinium, pyrazinium, imidazolium, pyrazolium, thiazolium, oxazolium, triazolium, imidazolinium, methylpyrrolidinium, isothiazolium, isoxazolium, oxazolium, pyrrolium, and thiophenium, wherein when substituted, the substituent group may be one or more of halo, alkyl consisting of from about six to about eighteen carbon atoms, and aryl groups, and two adjacent substituents may be joined together to form an alkylene radical consisting of from about six to about eighteen carbon atoms to form a ring structure converging on N; and

quaternary ammonium cation substituted by groups selected from the group consisting of alkyl consisting of from about six to about eighteen carbon atoms and aryl groups; and

BMIM (1-butyl-3-methylimidazolium); and

tetrabutyl ammonium, tributylmethyl ammonium, tetrabutyl phosphonium, tetraethyl ammonium, N,N-dialkyl pyrrolidinium, trimethyl-2-hydroxyethyl ammonium, N,N'-dialkyl imidazolium, N-alkylpyridinium, and a mixture thereof; and

(b) an anion having the structure (I):



I

wherein R_1 and R_2 are independently selected from the group consisting of substituted or unsubstituted alkyl or alkenyl groups consisting of from about six to about eighteen carbon atoms;

wherein R_3 is $-(CH_2)_n-$ wherein n is an integer of from about one to about 10, a substituted or unsubstituted heteroarylene group selected from the group consisting of pyrrolene, furanylene, thiophenylene, and pyridinylene, arylene group, or cycloalkylene group;

or R₁ and R₂ may be taken together to form a 5-7 membered carbocyclic ring; and wherein when any of R₁, R₂, R₃ are substituted, the substituent may be alkyl, NO₂, halo, cyano, silyl and OH groups.

Claims 2-6 (Canceled)

7. (Previously Presented) The composition of Claim 1, wherein n is one and R₁ and R₂ are -CH₂-CH(CH₂CH₃)(CH₂CH₂-CH₃).

Claims 8-22 (Canceled)

23. (Currently Amended) The composition of Claim [[22]] 1, wherein the cation is a ~~quaternary ammonium cation~~ independently selected from the group consisting of substituted or unsubstituted pyridinium, pyridazinium, pyrimidinium, pyrazinium, imidazolium, pyrazolium, thiazolium, oxazolium, triazolium, imidazolinium, methylpyrrolidinium, isothiazolium, isoxazolium, oxazolium, pyrrolium, and thiophenium, wherein when substituted, the substituent group may be one or more of halo, alkyl consisting of from about six to about eighteen carbon atoms, and aryl groups, and two adjacent substituents may be joined together to form an alkylene radical consisting of from about six to about eighteen carbon atoms to form a ring structure converging on N.

24. (Currently Amended) The composition of Claim 1, wherein the cation is a quaternary ammonium cation substituted by groups selected from the group consisting of alkyl consisting of from about six to about eighteen carbon atoms and aryl groups.

25. (Currently Amended) The composition of Claim 1, wherein the cation is BMIM (1-butyl-3-methylimidazolium).

26. (Currently Amended) The composition of Claim 1, wherein the cation is a ~~quaternary ammonium cation~~ selected from the group consisting of tetrabutyl ammonium, tributylmethyl ammonium, tetrabutyl phosphonium, tetraethyl ammonium, N,N-dialkyl pyrrolidinium, trimethyl-2-hydroxyethyl ammonium, N,N'-dialkyl imidazolium, N-alkylpyridinium, and a mixture thereof.

27. (Currently Amended) A hydrophobic ionic liquid composition comprising greater than 70 weight percent of an ionic liquid comprising:

(a) ~~a quaternary ammonium, phosphonium or sulfonium cation~~ independently selected from the group consisting of:

substituted or unsubstituted pyridinium, pyridazinium, pyrimidinium, pyrazinium, imidazolium, pyrazolium, thiazolium, oxazolium, triazolium, imidazolinium, methylpyrrolidinium, isothiazolium, isoxazolium, oxazolium, pyrrolium, and thiophenium, wherein when substituted, the substituent group may be one or more of halo, alkyl, and aryl groups, and two adjacent substituents may be joined together to form an alkylene radical consisting of from about six to about eighteen carbon atoms to form a ring structure converging on N; and

quaternary ammonium cation substituted by groups selected from the group consisting of alkyl and aryl groups; and

BMIM (1-butyl-3-methylimidazolium); and

tetrabutyl ammonium, tributylmethyl ammonium, tetrabutyl phosphonium, tetraethyl ammonium, N, N - dialkyl pyrrolidinium, trimethyl 2-hydroxyethyl ammonium, N, N' - dialkyl imidazolium, N-alkylpyridinium, and a mixture thereof; and

(b) an anion having the structure (I):



I

wherein R_1 and R_2 are independently selected from the group consisting of substituted or unsubstituted alkyl or alkenyl groups consisting of from about six to about eighteen carbon atoms;

wherein R_3 is $-(CH_2)_n-$ wherein n is an integer of from about one to about 10, a substituted or unsubstituted heteroarylene group selected from the group consisting of pyrrolene, furanylene, thiophenylenes, and pyridinylenes, arylene group, or cycloalkylene group;

or R_1 and R_2 may be taken together to form a 5-7 membered carbocyclic ring; and

wherein when any of R_1 , R_2 , R_3 are substituted, the substituent may be alkyl, NO_2 , halo, cyano, silyl and OH groups.

28. (Canceled)

29. (Canceled)

30. (Currently Amended) The composition of Claim [[29]] 27, wherein the cation is a ~~quaternary ammonium cation~~ independently selected from the group consisting of substituted or unsubstituted pyridinium, pyridazinium, pyrimidinium, pyrazinium, imidazolium, pyrazolium, thiazolium, oxazolium, triazolium, imidazolinium, methylpyrrolidinium, isothiazolium, isoxazolium, oxazolium, pyrrolium, and thiophenium, wherein when substituted, the substituent group may be one or more of halo, alkyl, and aryl groups, and two adjacent substituents may be joined together to form an alkylene radical consisting of from about six to about eighteen carbon atoms to form a ring structure converging on N.

31. (Currently Amended) The composition of Claim [[29]] 27, wherein the cation is a quaternary ammonium cation substituted by groups selected from the group consisting of alkyl and aryl groups.

32. (Currently Amended) The composition of Claim [[30]] 27, wherein the cation is BMIM (1-butyl-3-methylimidazolium).

33. (Currently Amended) The composition of Claim 27, wherein the cation is tetrabutyl ammonium, tributylmethyl ammonium, tetrabutyl phosphonium, tetraethyl ammonium, N, N - dialkyl pyrrolidinium, trimethyl 2-hydroxyethyl ammonium, N, N' - dialkyl imidazolium, N-alkylpyridinium, or a mixture thereof.

34. (Currently Amended) The composition of Claim 27, wherein the anion is Docusate (bis(2-ethylhexyl)sulfosuccinate diester).

Claims 35-36 (Canceled)

37. (Currently Amended) The composition of Claim 1, wherein the anion is hydrophilic.

38. (Canceled)

39. (Currently Amended) The composition of Claim 1, wherein the ionic liquid is hydrophobic.

40. (Canceled)

41. (Currently Amended) The composition of Claim 1, wherein the anion is selected from the group consisting of the anions of (i) di-cyclohexyl ester of sulfosuccinic acid; (ii) di-n-

octyl ester of sulfosuccinic acid; (iii) di-n-butyl ester of sulfosuccinic acid; (iv) di-isobutyl ester of sulfosuccinic acid; (v) di-neopentyl ester of sulfosuccinic acid; and (vi) di-n-heptyl ester of sulfosuccinic acid.

42. **(Currently Amended)** The composition of Claim 41, wherein the cation is tetrabutyl ammonium.

43. **(Currently Amended)** An ionic liquid composition, comprising greater than 70 weight percent of an ionic liquid comprising:

(a) a ~~quaternary ammonium, phosphonium or sulfonium~~ cation independently selected from the group consisting of:

substituted or unsubstituted pyridinium, pyridazinium, pyrimidinium, pyrazinium, imidazolium, pyrazolium, thiazolium, oxazolium, triazolium, imidazolinium, methylpyrrolidinium, isothiazolium, isoxazolium, oxazolium, pyrrolium, and thiophenium, wherein when substituted, the substituent group may be one or more of halo, alkyl, and aryl groups, and two adjacent substituents may be joined together to form an alkylene radical consisting of from about six to about eighteen carbon atoms to form a ring structure converging on N; and

quaternary ammonium cation substituted by groups selected from the group consisting of alkyl and aryl groups; and

tetrabutyl ammonium, tributylmethyl ammonium, tetrabutyl phosphonium, tetraethyl ammonium, N, N - dialkyl pyrrolidinium, trimethyl 2-hydroxyethyl ammonium, N, N' - dialkyl imidazolium, N-alkylpyridinium, 1-methyl-3-hexyl imadazolium and a mixture thereof; and

(b) an anion having the following structure:



III

wherein R₁, R₂, R₄, and R₅ are independently selected from the group consisting of a hydrogen atom and a carbon-containing group selected from the group consisting of alkyl, alkene, alkyne, aryl, and alkyl ether;

R₃ is a carbon-containing group selected from the group consisting of alkyl, alkenyl, alkynyl, aryl, and alkyl-ether; and

wherein the ionic liquid has a melting point that is less than about 100 °C.

44. **(Original)** The composition of Claim 43, wherein R₁ is 2-ethylhexyl, R₂ is ethyl, R₃ is a methylene group, R₄ is ethyl, and R₅ is 2-ethylhexyl.

45. **(Original)** The composition of Claim 44, wherein the cation is tetrabutyl ammonium.

46. **(Original)** The composition of Claim 44, wherein the cation is 1-methyl-3-hexyl imidazolium.

47. **(Original)** The composition of Claim 43, wherein R₁ is 2-ethylhexyl, R₂ is a hydrogen atom, R₃ is a methylene group, R₄ is a hydrogen atom, and R₅ is 2-ethylhexyl.

48. **(Original)** The composition of Claim 47, wherein the cation is tetrabutyl ammonium.

49. **(Original)** The composition of Claim 47, wherein the cation is 1-methyl-3-hexyl imidazolium.

50. **(Canceled)**

51. **(Previously Presented)** The composition of claim 1, wherein the cation and the anion form a molten salt having a melting point of less than about 100°C, the molten salt being selected from the group consisting of tetrabutylammonium docusate, MeBu₃N docusate, Me₃N(CH₂)₆NMe₃ docusate, Bu₄P docusate, Et₄N docusate, 1-hexyl-3-methyl imidazolium docusate, 1-octyl-3-methyl imidazolium bromide docusate, 1-butyl-3-methyl imidazolium docusate, and 1-methyl-2-ethyl imidazolium docusate, wherein docusate is bis(2-ethylhexyl)sulfosuccinate diester.

52. **(Previously Presented)** A composition comprising:

(a) an ionic liquid comprising an anion that is selected from the group consisting of docusate; di-n-hexyl ester of sulfosuccinic acid; di-cyclohexyl ester of sulfosuccinic acid; di-n-octyl ester of sulfosuccinic acid; di-n-butyl ester of sulfosuccinic acid; di-isobutyl ester of sulfosuccinic acid; di-neopentyl ester of sulfosuccinic acid; di-n-heptyl ester of sulfosuccinic acid; and di-(N-ethyl-N-(2-ethylhexyl)) amide of sulfosuccinic acid; and a quaternary ammonium, phosphonium or sulfonium cation; and

(b) CO₂ at supercritical conditions;

wherein the ionic liquid is dissolved in the CO₂.

Claims 53-56 **(Canceled)**

57. **(Currently Amended)** The ionic liquid composition of claim 1, wherein the ionic liquid melts at a temperature greater than about 40 °C but less than about 80 °C.

58. **(Currently Amended)** A composition, comprising:

a first ionic liquid combined with a second ionic liquid,

(a) the first ionic liquid comprising:

(i) a cation selected from the group consisting of ~~quaternary ammonium, sulfonium, and phosphonium cations~~ a quaternary ammonium cation substituted by groups selected from the group consisting of alkyl and halogen groups; and

an N-alkyl or N-alkoxy substituted saturated heterocycle; and

tributylmethyl ammonium, trimethylpentyl ammonium, trimethylbutyl ammonium, triethylmethyl ammonium, diethyldiethylammonium, trimethylchloromethyl ammonium, N-methyl-N-butyl pyrrolidinium and N-alkyl substituted piperidinium;

(ii) an anion having the formula Al_yR_{3y+1} wherein y is 1 or 2 and R is independently selected from the group consisting of an alkyl group consisting of from about six to about eighteen carbon atoms and halogen group;

(b) the second ionic liquid comprising an anion that is selected from the group consisting of docusate; di-n-hexyl ester of sulfosuccinic acid; di-cyclohexyl ester of sulfosuccinic acid; di-n-octyl ester of sulfosuccinic acid; di-n-butyl ester of sulfosuccinic acid; di-isobutyl ester of sulfosuccinic acid; di-neopentyl ester of sulfosuccinic acid; di-n-heptyl ester of sulfosuccinic acid; and di-(N-ethyl-N-(2-ethylhexyl)) amide of sulfosuccinic acid.

59. **(Original)** The composition of claim 58, further comprising reactants, the first and second ionic liquids being an effective reaction solvent for the reactants.

60. **(Currently Amended)** The composition of claim 1, comprising greater than 80 weight percent of the ionic liquid.

61. **(Currently Amended)** The composition of claim 27₁ comprising greater than 80 weight percent of the ionic liquid.
62. **(Currently Amended)** The composition of claim 43₁ comprising greater than 80 weight percent of the ionic liquid.
63. **(Currently Amended)** The composition of claim 1₁ wherein the anion and the cation are present in stoichiometric amounts.
64. **(Currently Amended)** The composition of claim 27₁ wherein the anion and the cation are present in stoichiometric amounts.
65. **(Currently Amended)** The composition of claim 43₁ wherein the anion and the cation are present in stoichiometric amounts.